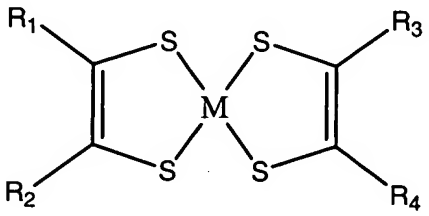
WHAT IS CLAIMED IS:

1. A fluid separation membrane for separating one or more components from a fluid, the fluid comprising two or more components, wherein the fluid separation membrane comprises at least one polymer and at least one dithiolene having the structure:



where M is a metal, wherein R_1, R_2, R_3, and R_4 are each independently alkyl, CH_3, CF_3, $C_6H_4OCH_3$, CN, or where R_1 and R_2 and/or R_3 and R_4 combine to form at least one ring.

2. The fluid separation membrane of claim 1, wherein the membrane exhibits an olefin/paraffin solubility selectivity.

3. The fluid separation membrane of claim 1, wherein the membrane exhibits an olefin/paraffin solubility selectivity of 1.1 to 2.0.

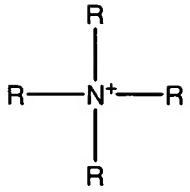
4. The fluid separation membrane of claim 1, wherein at least one dithiolene is resistant to poisoning by impurities.

5. The fluid separation membrane of claim 1, wherein the metal is Ni, Pd, or Pt.

6. The fluid separation membrane of claim 1, wherein at least one dithiolene further comprises a valence charge, and wherein the valence charge is 0, -1, or –2.

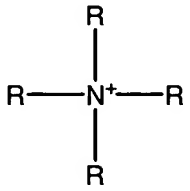
7. The fluid separation membrane of claim 1, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is –1 or –2, and wherein the dithiolene comprises a counter ion.

8. The fluid separation membrane of claim 1, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently an alkyl or aromatic compound.

9. The fluid separation membrane of claim 1, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently C_2H_5 or C_4H_9.

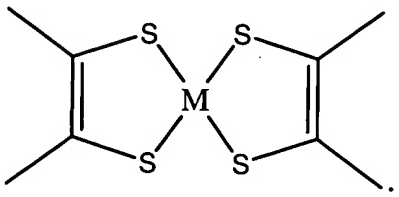
10. The fluid separation membrane of claim 1, wherein at least one dithiolene is capable of complexing with an olefin.

11. The fluid separation membrane of claim 1, wherein the fluid comprises a liquid.

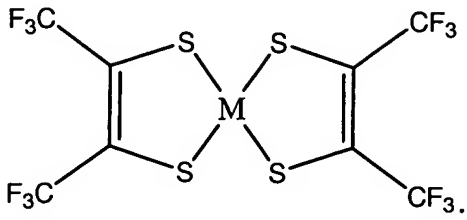
12. The fluid separation membrane of claim 1, wherein the fluid comprises a gas stream.

13. The fluid separation membrane of claim 1, wherein the fluid comprises a gas stream, and wherein the gas stream comprises a hydrocarbon.

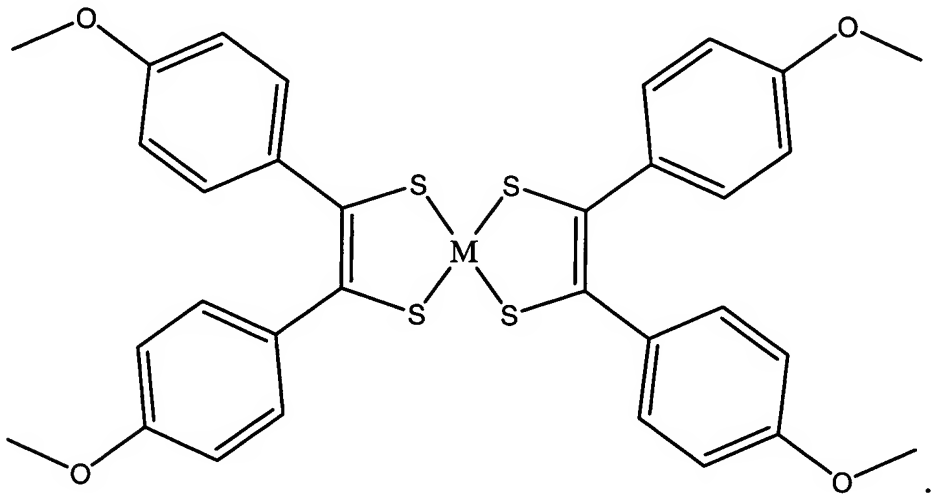
14. The fluid separation membrane of claim 1, wherein R_1, R_2, R_3, and R_4 are CH_3, at least one dithiolene having the structure:



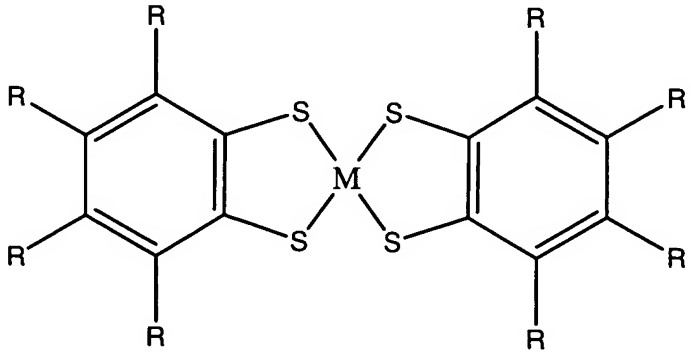
15. The fluid separation membrane of claim 1, wherein R_1, R_2, R_3, and R_4 are CF_3, at least one dithiolene having the structure:



16. The fluid separation membrane of claim 1, wherein R_1, R_2, R_3, and R_4 are $C_6H_4OCH_3$, at least one dithiolene having the structure:

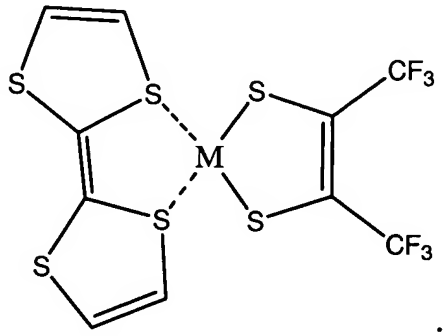


17. The fluid separation membrane of claim 1, wherein R_1 and R_2 combine to form $C_6H_3CH_3$, and wherein R_3 and R_4 combine to form $C_6H_3CH_3$, at least one dithiolene having the structure:



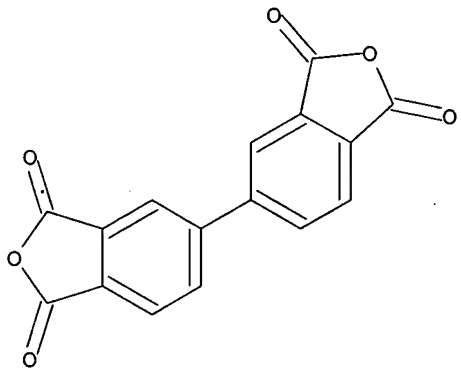
where each R is independently H, CH_3, alky, or aryl.

18. The fluid separation membrane of claim 1, wherein R_1 and R_2 combine to form $C_6H_4S_4$, and wherein R_3 and R_4 are CF_3, at least one dithiolene having the structure:

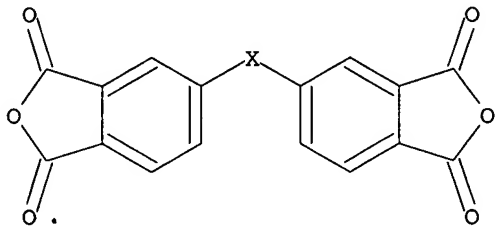


19. The fluid separation membrane of claim 1, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine.

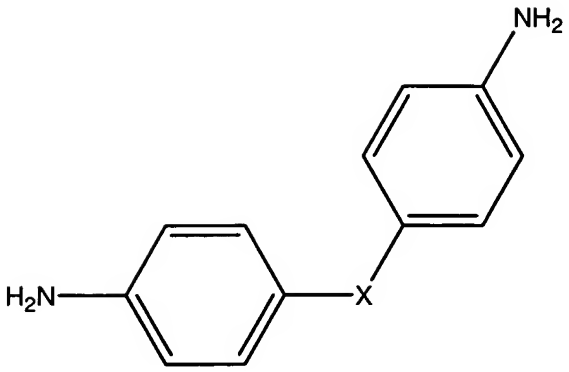
20. The fluid separation m embrane of claim 1, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine, wherein the tetraacid compound comprises an aromatic dianhydride having the structure:



or



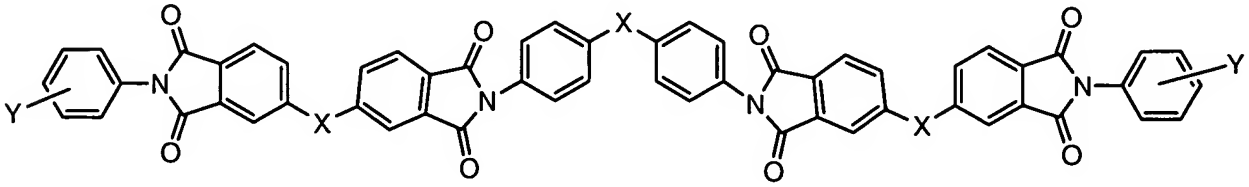
wherein the diamine having the structure:



and wherein each X is independently CH_2, C(O), $CH(CH_3)$, $C(CH_3)_2$, $C(CF_3)_2$, $C(CH_3)Ph$, $C(Ph)_2$, or cyclohexyl.

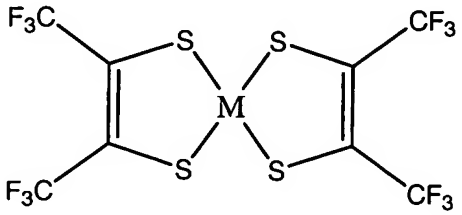
21. The fluid separation membrane of claim 1, wherein at least one polymer comprises a polyimide polymer, a polyamide polymer, a polypyrrolone polymer, or a poly (pyrrolone - imide) polymer.

22. The fluid separation membrane of claim 1, wherein at least one polymer comprises a polyimide polymer, wherein the polyimide polymer comprises recurring units, a portion of the recurring units having the structure:



where X is a linking group, and Y is another recurring unit, where recurring unit Y is coupled to the aromatic ring in an ortho, meta, or para relation to the imide group.

23. A fluid separation membrane for separating one or more components from a fluid, the fluid comprising two or more components, wherein the fluid separation membrane comprises at least one polymer and at least one dithiolene having the structure:



where M is a metal.

24. The fluid separation membrane of claim 23, wherein the membrane exhibits an olefin/paraffin solubility selectivity.

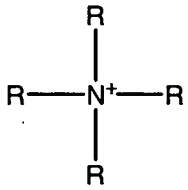
25. The fluid separation membrane of claim 23, wherein the membrane exhibits an olefin/paraffin solubility selectivity of 1.1 to 2.0.

26. The fluid separation membrane of claim 23, wherein the metal is Ni, Pd, or Pt.

27. The fluid separation membrane of claim 23, wherein at least one dithiolene further comprises a valence charge, and wherein the valence charge is 0, -1, or –2.

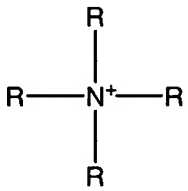
28. The fluid separation membrane of claim 23, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises a counter ion.

29. The fluid separation membrane of claim 23, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently an alkyl or aromatic compound.

30. The fluid separation membrane of claim 23, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently C_2H_5 or C_4H_9.

31. The fluid separation membrane of claim 23, wherein at least one dithiolene is capable of complexing with an olefin.

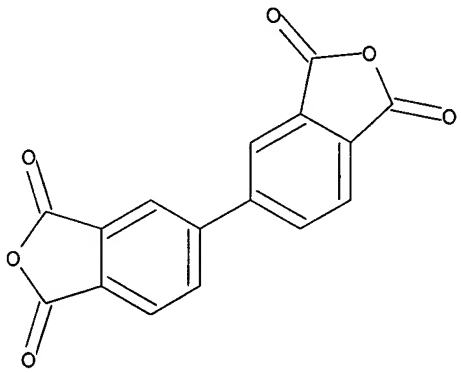
32. The fluid separation membrane of claim 23, wherein the fluid comprises a liquid.

33. The fluid separation membrane of claim 23, wherein the fluid comprises a gas stream.

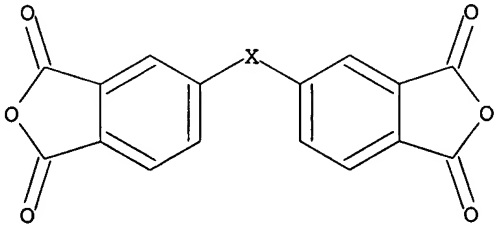
34. The fluid separation membrane of claim 23, wherein the fluid comprises a gas stream, and wherein the gas stream comprises a hydrocarbon.

35. The fluid separation membrane of claim 23, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine.

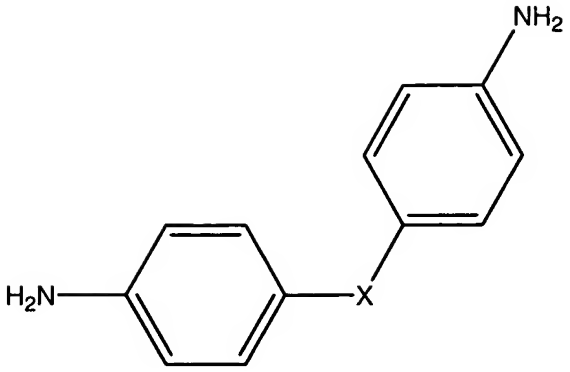
36. The fluid separation membrane of claim 23, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine, wherein the tetraacid compound comprises an aromatic dianhydride having the structure:



or



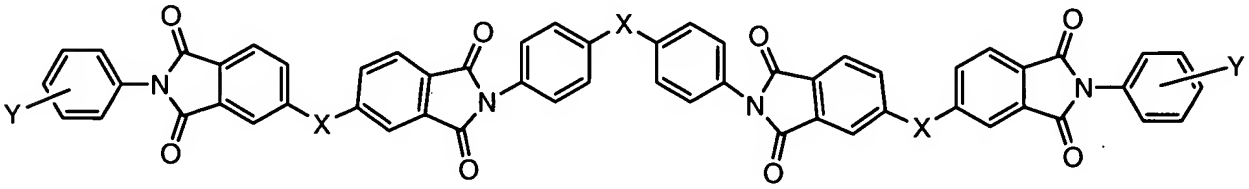
wherein the diamine having the structure:



and wherein each X is independently CH_2, C(O), $CH(CH_3)$, $C(CH_3)_2$, $C(CF_3)_2$, $C(CH_3)Ph$, $C(Ph)_2$, or cyclohexyl.

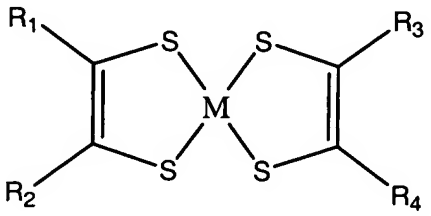
37. The fluid separation membrane of claim 23, wherein at least one polymer comprises a polyimide polymer, a polyamide polymer, a polypyrrolone polymer, or a poly (pyrrolone - imide) polymer.

38. The fluid separation membrane of claim 23, wherein at least one polymer comprises a polyimide polymer, wherein the polyimide polymer comprises recurring units, a portion of the recurring units having the structure:



where X is a linking group, and Y is another recurring unit, where recurring unit Y is coupled to the aromatic ring in an ortho, meta, or para relation to the imide group.

39. A method of preparing a fluid separation membrane for separating one or more components from a fluid, the fluid comprising two or more components, comprising adding at least one dithiolene to at least one polymer, the dithiolene having the structure:



where M is a metal, wherein R_1, R_2, R_3, and R_4 are each independently alkyl, CH_3, CF_3, $C_6H_4OCH_3$, CN, or where R_1 and R_2 and/or R_3 and R_4 combine to form at least one ring.

40. The method of claim 39, wherein the membrane exhibits an olefin/paraffin solubility selectivity.

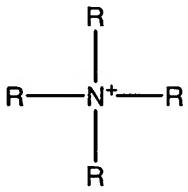
41. The method of claim 39, wherein the membrane exhibits an olefin/paraffin solubility selectivity of 1.1 to 2.0.

42. The method of claim 39, wherein the metal is Ni, Pd, or Pt.

43. The method of claim 39, wherein at least one dithiolene further comprises a valence charge, and wherein the valence charge is 0, -1, or –2.

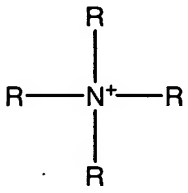
44. The method of claim 39, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises a counter ion.

45. The method of claim 39, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently an alkyl or aromatic compound.

46. The method of claim 39, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently C_2H_5 or C_4H_9.

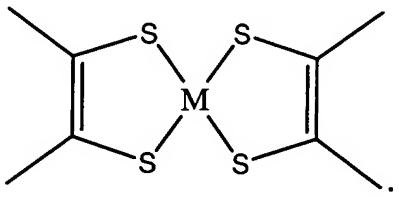
47. The method of claim 39, wherein at least one dithiolene is capable of complexing with an olefin.

48. The method of claim 39, wherein the fluid comprises a liquid.

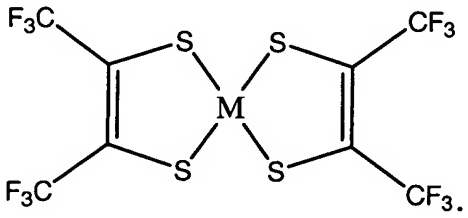
49. The method of claim 39, wherein the fluid comprises a gas stream.

50. The method of claim 39, wherein the fluid comprises a gas stream, and wherein the gas stream comprises a hydrocarbon.

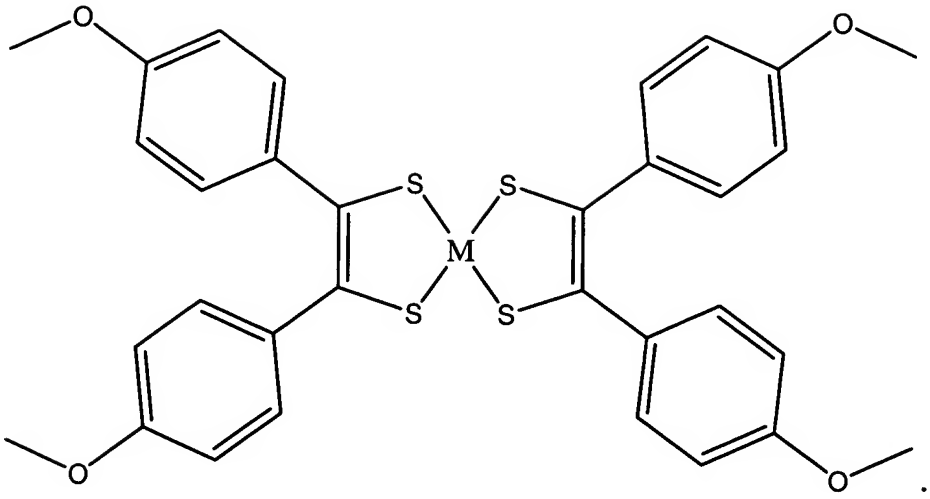
51. The method of claim 39, wherein R_1, R_2, R_3, and R_4 are CH_3, at least one dithiolene having the structure:



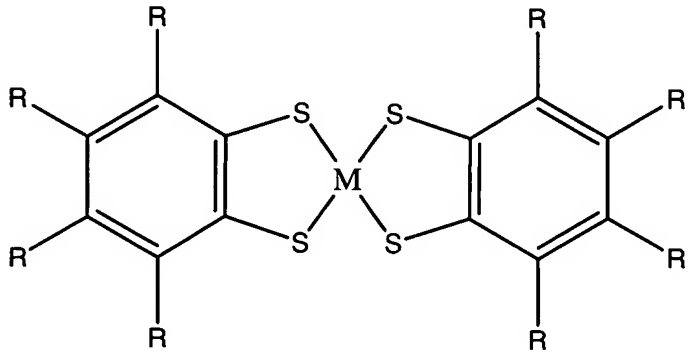
52. The method of claim 39, wherein R_1, R_2, R_3, and R_4 are CF_3, at least one dithiolene having the structure:



53. The method of claim 39, wherein R_1, R_2, R_3, and R_4 are $C_6H_4OCH_3$, at least one dithiolene having the structure:

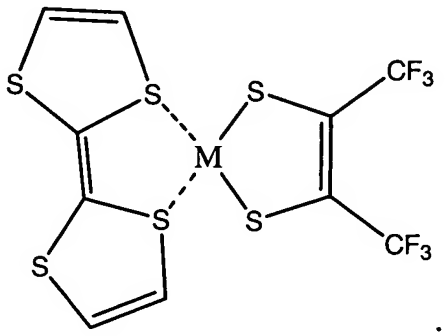


54. The method of claim 39, wherein R_1 and R_2 combine to form $C_6H_3CH_3$, and wherein R_3 and R_4 combine to form $C_6H_3CH_3$, at least one dithiolene having the structure:



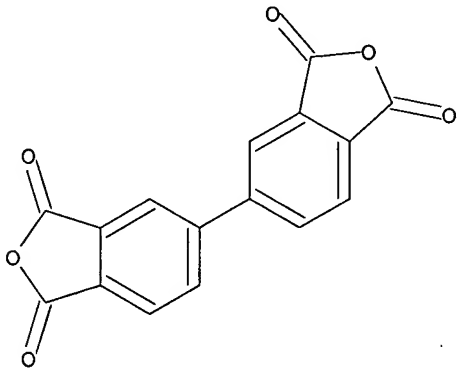
where each R is independently H, CH_3, alky, or aryl.

55. The method of claim 39, wherein R_1 and R_2 combine to form $C_6H_4S_4$, and wherein R_3 and R_4 are CF_3, at least one dithiolene having the structure:

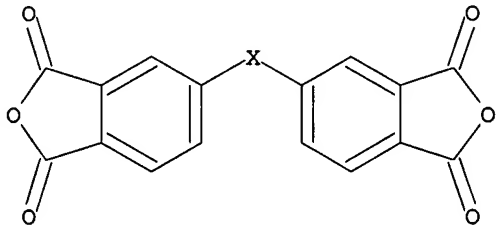


56. The method of claim 39, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine.

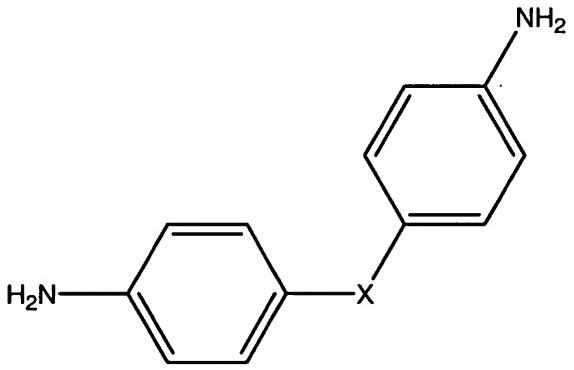
57. The method of claim 39, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine, wherein the tetraacid compound comprises an aromatic dianhydride having the structure:



or



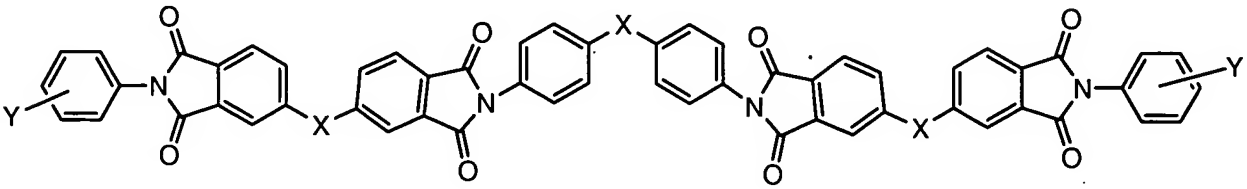
wherein the diamine having the structure:



and wherein each X is independently CH_2, C(O), $CH(CH_3)$, $C(CH_3)_2$, $C(CF_3)_2$, $C(CH_3)Ph$, $C(Ph)_2$, or cyclohexyl.

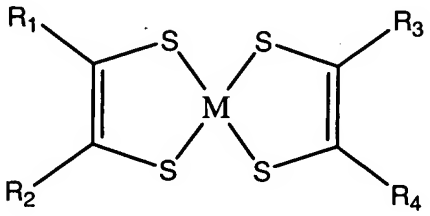
58. The method of claim 39, wherein at least one polymer comprises a polyimide polymer, a polyamide polymer, a polypyrrolone polymer, or a poly (pyrrolone - imide) polymer.

59. The method of claim 39, wherein at least one polymer comprises a polyimide polymer, wherein the polyimide polymer comprises recurring units, a portion of the recurring units having the structure:



where X is a linking group, and Y is another recurring unit, where recurring unit Y is coupled to the aromatic ring in an ortho, meta, or para relation to the imide group.

60. A method of separating one or more components from a fluid, the fluid comprising two or more components, comprising bringing the fluid stream into contact with a face of a fluid separation membrane, the fluid separation membrane comprising at least one polymer and at least one dithiolene having the structure:



where M is a metal, wherein R_1, R_2, R_3, and R_4 are each independently alkyl, CH_3, CF_3, $C_6H_4OCH_3$, CN, or where R_1 and R_2 and/or R_3 and R_4 combine to form at least one ring.

61. The method of claim 60, wherein the membrane exhibits an olefin/paraffin solubility selectivity.

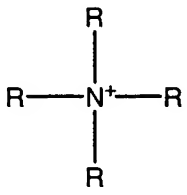
62. The method of claim 60, wherein the membrane exhibits an olefin/paraffin solubility selectivity of 1.1 to 2.0.

63. The method of claim 60, wherein the metal is Ni, Pd, or Pt.

64. The method of claim 60, wherein at least one dithiolene further comprises a valence charge, and wherein the valence charge is 0, -1, or –2.

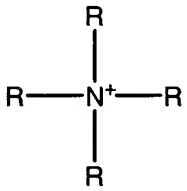
65. The method of claim 60, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises a counter ion.

66. The method of claim 60, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently an alkyl or aromatic compound.

67. The method of claim 60, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently C_2H_5 or C_4H_9.

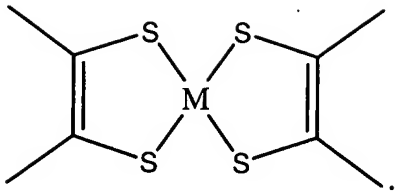
68. The method of claim 60, wherein at least one dithiolene is capable of complexing with an olefin.

69. The method of claim 60, wherein the fluid comprises a liquid.

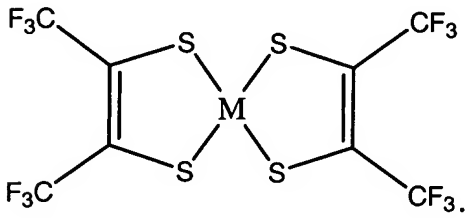
70. The method of claim 60, wherein the fluid comprises a gas stream.

71. The method of claim 60, wherein the fluid comprises a gas stream, and wherein the gas stream comprises a hydrocarbon.

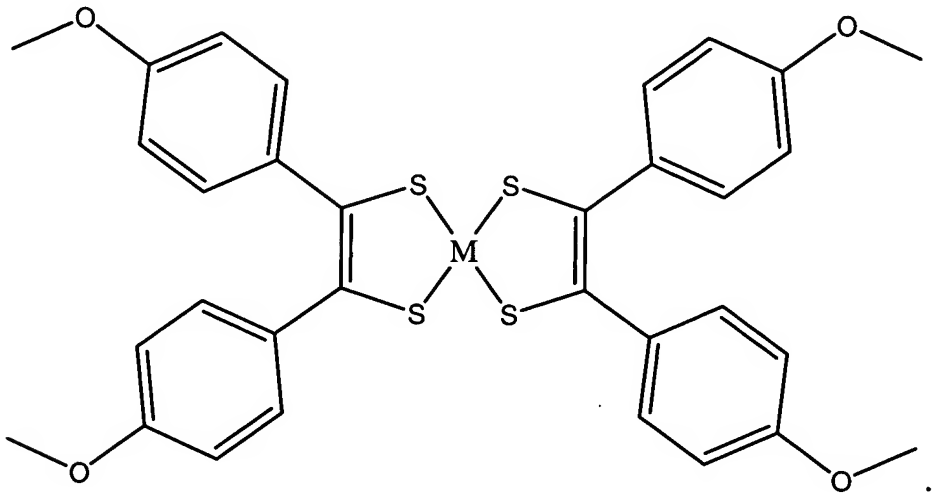
72. The method of claim 60, wherein R_1, R_2, R_3, and R_4 are CH_3, at least one dithiolene having the structure:



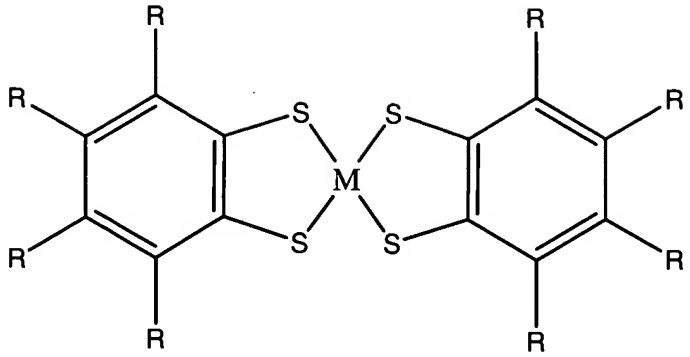
73. The method of claim 60, wherein R_1, R_2, R_3, and R_4 are CF_3, at least one dithiolene having the structure:



74. The method of claim 60, wherein R_1, R_2, R_3, and R_4 are $C_6H_4OCH_3$, at least one dithiolene having the structure:

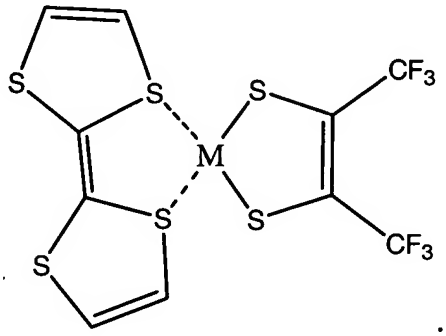


75. The method of claim 60, wherein R_1 and R_2 combine to form $C_6H_3CH_3$, and wherein R_3 and R_4 combine to form $C_6H_3CH_3$, at least one dithiolene having the structure:



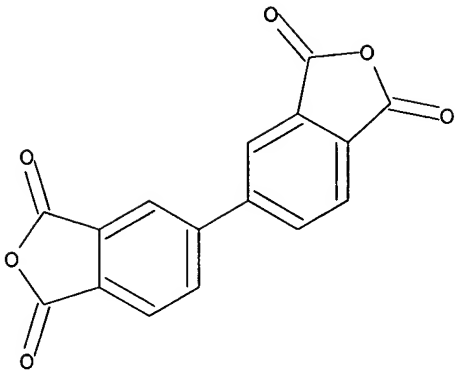
where each R is independently CH_3, alky, or aryl.

76. The method of claim 60, wherein R_1 and R_2 combine to form $C_6H_4S_4$, and wherein R_3 and R_4 are CF_3, at least one dithiolene having the structure:

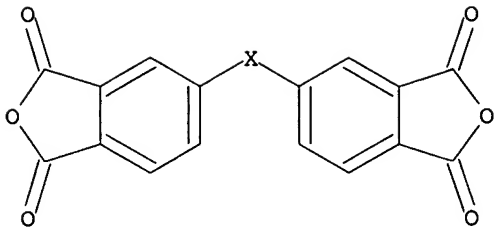


77. The method of claim 60, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine.

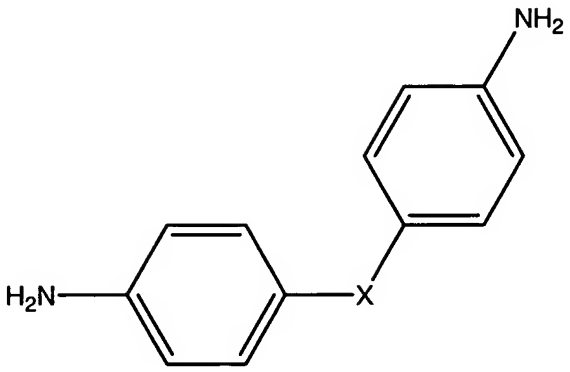
78. The method of claim 60, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine, wherein the tetraacid compound comprises an aromatic dianhydride having the structure:



or



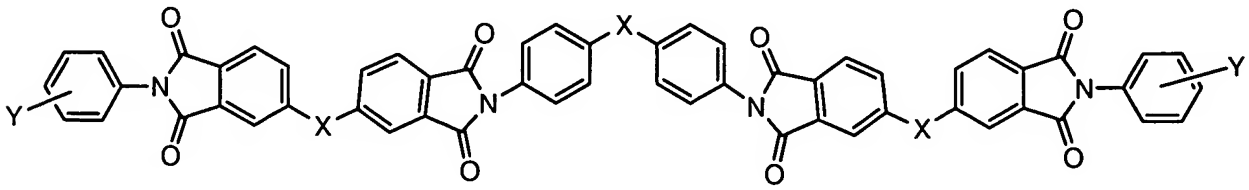
wherein the diamine having the structure:



and wherein each X is independently CH_2, C(O), $CH(CH_3)$, $C(CH_3)_2$, $C(CF_3)_2$, $C(CH_3)Ph$, $C(Ph)_2$, or cyclohexyl.

79. The method of claim 60, wherein at least one polymer comprises a polyimide polymer, a polyamide polymer, a polypyrrolone polymer, or a poly (pyrrolone - imide) polymer.

80. The method of claim 60, wherein at least one polymer comprises a polyimide polymer, wherein the poly (pyrrolone-imide) polymer comprises recurring units, a portion of the recurring units having the structure:

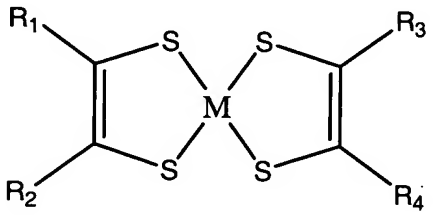


where X is a linking group, and Y is another recurring unit, where recurring unit Y is coupled to the benzene ring in an ortho, meta, or para relation to the imide group.

81. An apparatus for separating one or more components from a fluid, the fluid comprising two or more components, comprising:

a body;

a fluid separation membrane disposed within the body, the fluid separation membrane comprising at least one polymer and at least one dithiolene having the structure:



where M is a metal, wherein R_1, R_2, R_3, and R_4 are each independently alkyl, CH_3, CF_3, $C_6H_4OCH_3$, CN, or where R_1 and R_2 and/or R_3 and R_4 combine to form at least one ring;

a fluid stream inlet coupled to the body downstream from the fluid separation membrane;

a first fluid stream outlet positioned upstream from the fluid stream inlet and down stream from the fluid separation membrane; and

a second fluid stream outlet positioned downstream from the fluid separation membrane.

82. The apparatus of claim 81, wherein the membrane exhibits an olefin/paraffin solubility selectivity.

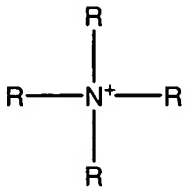
83. The apparatus of claim 81, wherein the membrane exhibits an olefin/paraffin solubility selectivity of 1.1 to 2.0.

84. The apparatus of claim 81, wherein the metal is Ni, Pd, or Pt.

85. The apparatus of claim 81, wherein at least one dithiolene further comprises a valence charge, and wherein the valence charge is 0, -1, or –2.

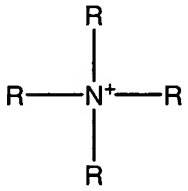
86. The apparatus of claim 81, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises a counter ion.

87. The apparatus of claim 81, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently an alkyl or aromatic compound.

88. The apparatus of claim 81, wherein at least one dithiolene further comprises a valence charge, wherein the valence charge is -1 or –2, and wherein the dithiolene comprises at least one counter ion having the structure:



where each R is independently C_2H_5 or C_4H_9.

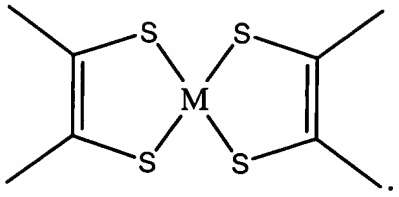
89. The apparatus of claim 81, wherein at least one dithiolene is capable of complexing with an olefin.

90. The apparatus of claim 81, wherein the fluid comprises a liquid.

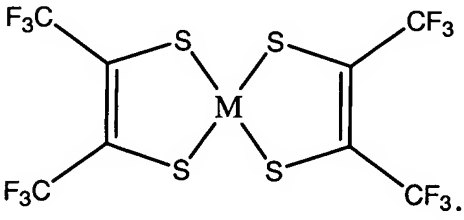
91. The apparatus of claim 81, wherein the fluid comprises a gas stream.

92. The apparatus of claim 81, wherein the fluid comprises a gas stream, and wherein the gas stream comprises a hydrocarbon.

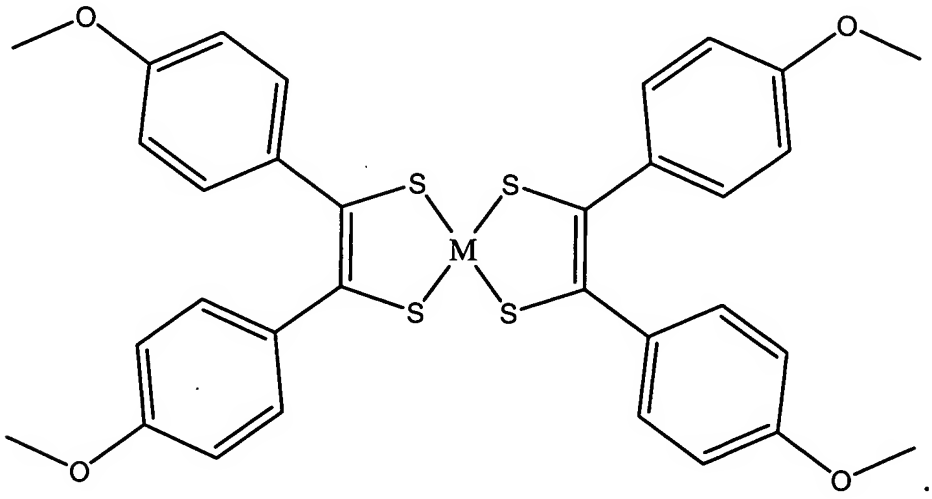
93. The apparatus of claim 81, wherein R_1, R_2, R_3, and R_4 are CH_3, at least one dithiolene having the structure:



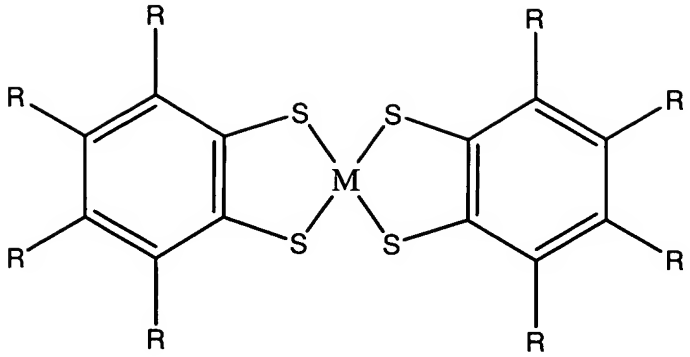
94. The apparatus of claim 81, wherein R_1, R_2, R_3, and R_4 are CF_3, at least one dithiolene having the structure:



95. The apparatus of claim 81, wherein R_1, R_2, R_3, and R_4 are $C_6H_4OCH_3$, at least one dithiolene having the structure:

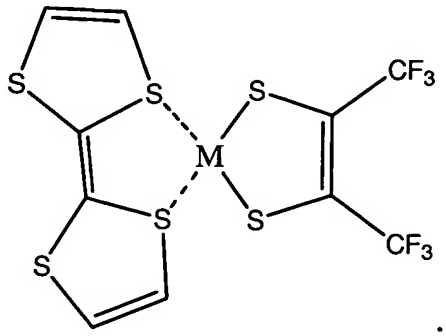


96. The apparatus of claim 81, wherein R_1 and R_2 combine to form $C_6H_3CH_3$, and wherein R_3 and R_4 combine to form $C_6H_3CH_3$, at least one dithiolene having the structure:



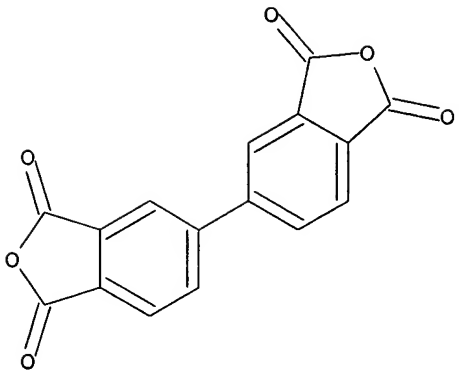
where each R is independently CH_3, alky, or aryl.

97. The apparatus of claim 81, wherein R_1 and R_2 combine to form $C_6H_4S_4$, and wherein R_3 and R_4 are CF_3, at least one dithiolene having the structure:

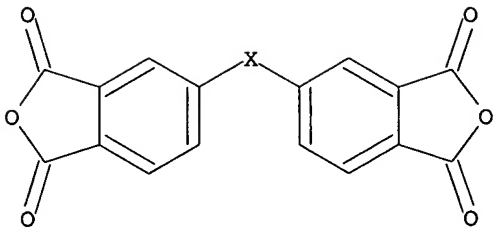


98. The apparatus of claim 81, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine.

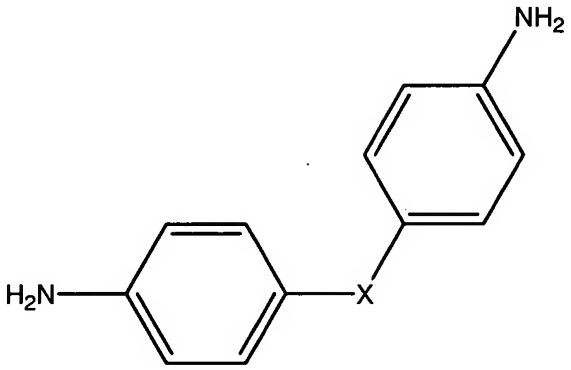
99. The apparatus of claim 81, wherein at least one polymer comprises the reaction product of a tetraacid compound and a diamine, wherein the tetraacid compound comprises an aromatic dianhydride having the structure:



or



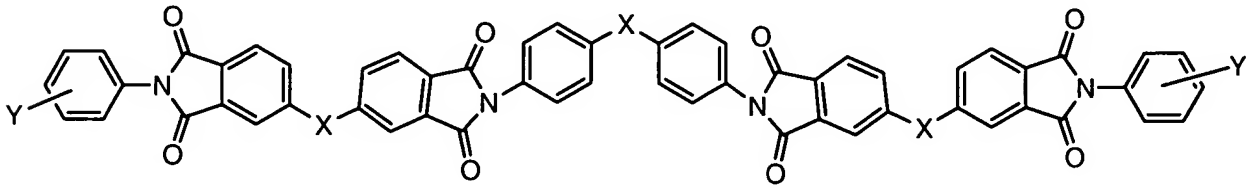
wherein the diamine having the structure:



and wherein each X is independently CH_2, C(O), $CH(CH_3)$, $C(CH_3)_2$, $C(CF_3)_2$, $C(CH_3)Ph$, $C(Ph)_2$, or cyclohexyl.

100. The apparatus of claim 81, wherein at least one polymer comprises a polyimide polymer, a polyamide polymer, a polypyrrolone polymer, or a poly (pyrrolone - imide) polymer.

101. The apparatus of claim 81, wherein at least one polymer comprises a polyimide polymer, wherein the polyimide polymer comprises recurring units, a portion of the recurring units having the structure:



where X is a linking group, and Y is another recurring unit, where recurring unit Y is coupled to the benzene ring in an ortho, meta, or para relation to the imide group.